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ADST
Interface Requirements Specification
for the
Protocol Translator
of
Advanced Distributed Simulation Technology/
Crew Station Research and Development Facility

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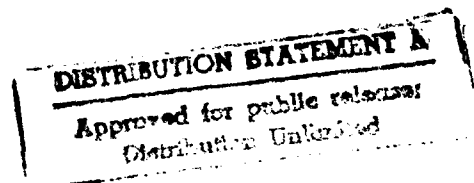AUG 0 9, 1994
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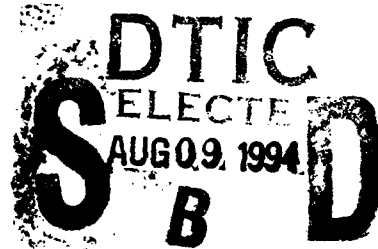
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13. ABSTRACT (Maximum 200 words)

This document describes the following interfaces: DIS Network to Protocol Translator, SIMNET Network to Protocol Translator, Protocol Translator to DIS Shared Memory, Protocol Translator to SIM Shared Memory, Protocol Translator User Interface to DIS Shared Memory, Protocol Translator User Interface to SIM Shared Memory.

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1   Scope

1.1   Identification

The approved identification number for ADST/CSRDF Protocol Translator Interface Requirements Specification is ADST/WDL/TR--93--003065. This document describes the following interfaces:

   DIS Network to Protocol Translator
   SIMNET Network to Protocol Translator
   Protocol Translator to DIS Shared Memory
   Protocol Translator to SIM Shared Memory
   Protocol Translator User Interface to DIS Shared Memory
   Protocol Translator User Interface to SIM Shared Memory

1.2   System Overview

The Protocol Translator (PT) translates Protocol Data Units (PDUs) from one protocol format to another. The Protocol Translator is compatible with Distributed Interactive Simulation (DIS) protocol version 1.0 and Simulation Networking (SIMNET) protocol version 6.6.1. The Protocol Translator receives DIS Protocol Data Units (PDUs) from the DIS network, translates them to SIMNET format, and sends the translated PDUs to the SIMNET network. A similar process applies to the SIMNET to DIS translation.

The Protocol Translator logs translation statistics to shared memory for access by the DIS-to-SIM and SIM-to-DIS processes. This information is then used by the "Protocol Translator User Interface", a Protocol Translator utility which shows Protocol Translator statistics, such as the rate of PDUs translated, per second. The translation statistics are also written to a statistical file for archival purposes, and post-exercise review.

1.3   Document Overview

This document describes the interface requirements for the Protocol Translator (PT) and Protocol Translator User Interface (PTUI). This document consists of the following sections: applicable documents, interface specification, quality assurance, preparation for delivery, and notes.

2   Applicable Documents

2.1   Government Documents

The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of the specification, the contents of this specification shall be considered a superseding requirement.

SPECIFICATIONS:

Other Government Agency

[1.1]   Interface Control Document (ICD) for the BDS-D Network Interface, 14 February, 1992 (Last updated: 21-Feb-92 17:58)

STANDARDS:

Military

[2.1]   N61339-91-C-0091, Protocol Data Units for Entity Information and Entity Interaction in a Distributed Interactive Simulation, DIS standard 1.0 with Extension, May 8, 1992.

[2.2]   BBN Report No. 7627, The SIMNET Network and Protocols, version 6.6.1, June 1991.

Copies of specifications, standards, drawings, and publications required by suppliers in connection with specified procurement functions should be obtained from the contracting agency or as directed by the contracting office.

2.2   Non-Government Documents

The following documents of the exact issue shown form a part of this specification to the extent specified herein. In the event of conflict between the documents referenced herein and the contents of this specification, the contents of this specification shall be considered a superseding requirement.

SPECIFICATIONS:

[5.1]   <u>Software Requirements Specification for the Protocol Translator of Advanced Distributed Simulation Technology (ADST)/Crew Station Research and Development Facility (CSRDF)</u> Rev. Basic: June 16, 1992, Contract No.N61339-91-D-0001. Prepared by Loral Western Development Labs.

OTHER PUBLICATIONS:

Manual

[6.1]   ADST/SW/TR--93--003064, <u>ADST Software Maintenance Manual for the CSRDF Protocol Translator</u>, February 26,1993. Contract No.N61339-91-D-0001. Prepared by Loral Western Development Labs.

[6.2]   SUN Microsystems: part #800-3850-10, <u>Network Programming Guide</u>, Revision A of @7 March, 1990.

3   Interface Specification

SIMNET Ethernet Network
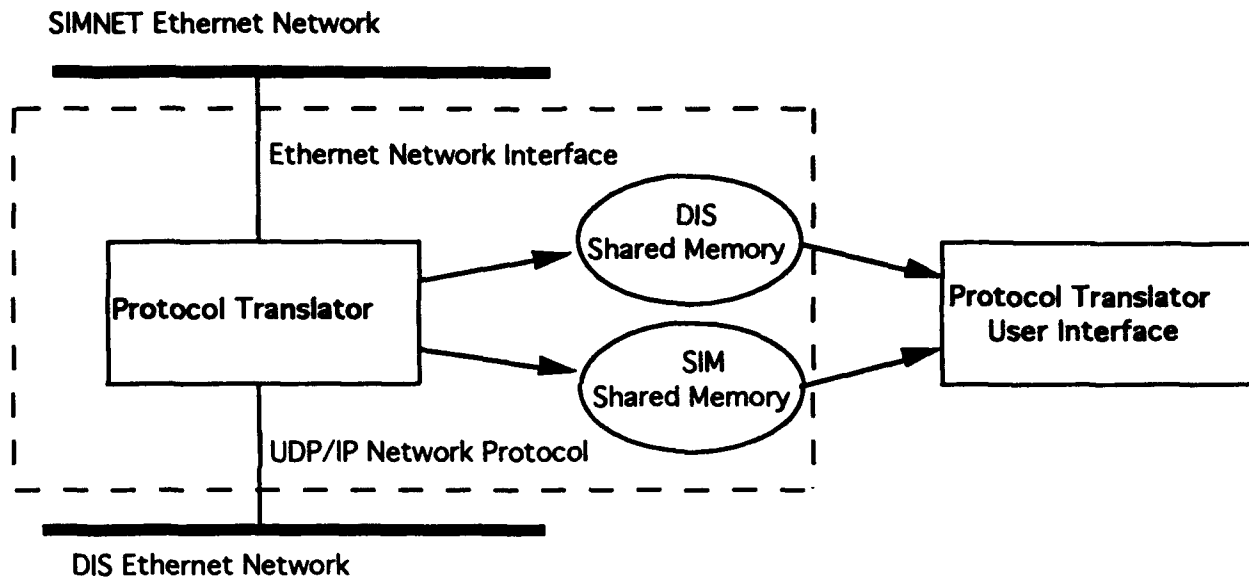
Figure 3.1. Protocol Translator External Interfaces

The Protocol Translator External Interfaces are outside the bounding box of Figure 3.1. The DIS and SIM Shared Memories also interface to a Protocol Translator utility software, "Protocol Translator User Interface", where on-line or off-line translation statistics will be displayed.

3.1   DIS Network to Protocol Translator Interface

The DIS interface supports PDU communication between the Protocol Translator's DIS to SIM translation process and the DIS Ethernet Network.

3.1.1   Interface Requirements

Refer to SRS section 3.1. for CSCI external interface requirements.

XLAT001   Application Interface Service - refer to SRS section 3.1.1-1

XLAT002   Network Protocol Services - refer to SRS section 3.1.1-2 for requirement description. Refer to [6.1] section 4.1.1 Network Interface Software and section 4.3 Runtime Environment Description for examples and details.

XLAT007   DIS Protocols - refer to SRS section 3.1.2-5 for requirement
            description. Refer to [6.2] section 10.7 "Datagrams in the Internet
            Domain" for examples.

3.1.2 Data Requirements

The UDP/IP hides the topology and characteristics of the underlying network
from its user. Refer to [2.1] and [5.1] for DIS PDU contents. The following
table lists data elements that are communicated between the DIS Network
and the Protocol Translator and are accessible by the user:

Table 3.1.2.1. DIS Network Interface Data Element Definition Table

IDENTIFIER	DESCRIPTION	SOURCE	DESTINATION CSCI(S)
PTDI001	source address	DIS Network	Protocol Translator
PTDI002	port number	"	"
PTDI003	Internet Family	"	"
PTDI004	input DIS PDU	"	"
PTDI011	destination address	Protocol Translator	DIS Network
PTDI012	port number	"	"
PTDI013	Internet Family	"	"
PTDI014	output DIS PDU	"	"

3.2   SIMNET Network to Protocol Translator Interface

The SIMNET interface supports PDU communication between the Protocol
Translator's SIM˜to DIS translation process and the SIMNET Ethernet
Network. Refer to [6.1] section 4.1.1 Network Interface Software.

3.2.1 Interface Requirements

Refer to SRS section 3.1. for CSCI external interface requirements.

XLAT002   Network Protocol Services - refer to SRS section 3.1.1-2 for
            requirement description. Refer to [6.1] section 4.1.1 Network
            Interface Software and section 4.3 Runtime Environment
            Description for examples and details.

XLAT008   SIMNET Protocols - refer to SRS section 3.1.2-6.

3.2.2 Data Requirements

The following table lists data elements that are communicated between the SIMNET Network and the Protocol Translator (refer to [2.2] and [5.1] for SIMNET APDU and SIMNET PDU contents):

Table 3.2.2.1. SIMNET Network Interface Data Element Definition Table

IDENTIFIER	DESCRIPTION	SOURCE	DESTINATION CSCI(S)
PTDI021	source address	SIMNET Network	Protocol Translator
PTDI022	destination address	"	"
PTDI023	input packet length	"	"
PTDI024	DSAP	"	"
PTDI025	SSAP	"	"
PTDI026	control field	"	"
PTDI027	Protocol ID	"	"
PTDI028	Ether Type	"	"
PTDI029	SIMNET APDU	"	"
PTDI030	SIMNET PDU	"	"
PTDI031	source address	Protocol Translator	SIMNET Network
PTDI032	destination address	"	"
PTDI033	output packet length	"	"
PTDI034	DSAP	"	"
PTDI035	SSAP	"	"
PTDI036	control field	"	"
PTDI037	Protocol ID	"	"
PTDI038	Ether Type	"	"
PTDI039	SIMNET APDU	"	"
PTDI040	SIMNET PDU	"	"

3.3   DIS and SIM Shared Memory to Protocol Translator Interface

The Protocol Translator interfaces to DIS and SIM shared memories to record translation statistics.   The DIS Shared Memory contains DIS to SIM translation statistics while the SIM Shared Memory contains SIM to DIS translation statistics. These statistics are written to a file and are read by the Protocol Translator User Interface utility.

3.3.1   Interface Requirements

PTIF021   The DIS and SIM shared memories to Protocol Translator Interface shall utilize SUN Microsystems' library functions to attach and detach a shared memory.

3.3.2   Data Requirements

The following table lists data elements that are written by the Protocol Translator to DIS Shared Memory:

Table 3.3.2.1. Protocol Translator to DIS Shared Memory Interface Data Element Definition Table

IDENTIFIER	DESCRIPTION	SOURCE	DESTINATION CSCI(S)
PTDI061	start time	Protocol Translator's DIS to SIM translation process	DIS Shared Memory
PTDI062	end time	"	"
PTDI063	elapse time	"	"
PTDI064	# of PDUs received	"	"
PTDI065	# of PDUs translated	"	"
PTDI066	# of translated PDUs not sent	"	"
PTDI067	# of PDUs not translated	"	"
PTDI068	# of Entity State PDUs	"	"
PTDI069	# of Entity State PDUs requiring dead reckon	"	"
PTDI070	# of Dead Reckoning rebroadcasts	"	"
PTDI071	I am alive timer expiration		
PTDI072	# of unknown PDUs	"	"
PTDI073	# of PDUs trashed upon receipt	"	"
PTDI074	# of PDUs trashed before transmit	"	"
PTDI075	# of PDUs with bad association kind	"	"
PTDI076	# of PDUs with bad association length	"	"
PTDI077	# of PDUs with bad association protocol_id	"	"
PTDI078	# of PDUs with bad Exercise ID	"	"
PTDI079	# of PDUs with excess radar targets	"	"
PTDI080	# of PDUs with unknown fire types	"	"
PTDI081	# of PDUs with unknown vehicle statistics	"	"
PTDI082	# of PDUs with bad Ethernet type	"	"
PTDI083	# of PDUs with bad protocol_id	"	"
PTDI084	# of PDUs with bad DSAP	"	"
PTDI085	# of PDUs with bad SSAP	"	"
PTDI086	# of PDUs with bad control number	"	"
PTDI087	last 100 statistics	"	"

The following table lists data elements that are written by the Protocol Translator to SIM Shared Memory:

Table 3.3.2.2. Protocol Translator to SIM Shared Memory Interface Data Element Definition Table

IDENTIFIER	DESCRIPTION	SOURCE	DESTINATION CSCI(S)

PTDI061	start time	Protocol Translator's SIM to DIS translation process	SIM Shared Memory
PTDI062	end time	"	"
PTDI063	elapse time	"	"
PTDI064	# of PDUs received	"	"
PTDI065	# of PDUs translated	"	"
PTDI066	# of translated PDUs not sent	"	"
PTDI067	# of PDUs not translated	"	"
PTDI068	# of vehicle appearance PDUs	"	"
PTDI069	# of unknown PDUs	"	"
PTDI070	# of PDUs trashed upon receipt	"	"
PTDI071	# of PDUs trashed before transmit		
PTDI072	# of PDUs with bad association kind	"	"
PTDI073	# of PDUs with bad association length	"	"
PTDI074	# of PDUs with bad association protocol_id	"	"
PTDI075	# of PDUs with bad Exercise ID	"	"
PTDI076	# of PDUs with excess radar targets	"	"
PTDI077	# of PDUs with unknown fire types	"	"
PTDI078	# of PDUs with unknown vehicle statistics	"	"
PTDI079	# of PDUs with bad Ethernet type	"	"
PTDI080	# of PDUs with bad protocol_id	"	"
PTDI081	# of PDUs with bad DSAP	"	"
PTDI082	# of PDUs with bad SSAP	"	"
PTDI083	# of PDUs with bad control number	"	"
PTDI084	last 100 statistics	"	"

3.4   Protocol Translator User Interface to DIS and SIM Shared Memory Interfaces

The Protocol Translator User Interface is utility software for displaying PT on-line or off-line translation statistics. The PTUI reads DIS and SIM Shared Memories to retrieve translation statistics. The Protocol Translator User Interface reads the DIS to SIM translation statistics from the DIS shared memory and reads the SIM to DIS translation statistics from the SIM shared memory.

3.4.1   Interface Requirements

PTIF031   The Protocol Translator User Interface to DIS and SIM shared memories shall utilize SUN Microsystems' library functions to attach and detach a shared memory.

3.4.2 Data Requirements

Refer to table 3.3.2.1 for data elements communicated between the Protocol Translator User Interface and the DIS Shared Memory.

Refer to table 3.3.2.2 for data elements communicated between the Protocol Translator User Interface and the SIM Shared Memory.

Refer to Appendix C of reference [5.1] for DIS and SIMNET external interfaces' data requirements (subsets of DIS 1.0 standard PDUs and subsets of SIMNET 6.6.1 standard PDUs).

4   Quality Assurance

Not applicable.

5   Preparation for Delivery

Not applicable.

6   Notes

List of Acronyms:

ADST   Advanced Distributed Simulation Technology
APDU   Association Protocol Data Units (Association Layer)
CSRDF   Crew Station Research and Development Facility
DIS   Distributed Interactive Simulation
UDP   User Datagram Protocol
PT   Protocol Translator
PTDI   Protocol Translator Data Item
PTIF   Protocol Translator Interface
PTUI   Protocol Translator User Interface
SIMNET   Simulation Networking